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| EXAMINER |
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TRINH, HOA B

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| ART UNIT | PAPER NUMBER |
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2893

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01/25/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptomailbox@whdlaw.com  
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|                              |                                      |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/077,554 | <b>Applicant(s)</b><br>COBBLEY ET AL. |  |
|                              | <b>Examiner</b><br>HOA B. TRINH      | <b>Art Unit</b><br>2893               |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11, 16, 17, 19, 21-32, 34-37, 44-53, 55-76 and 85-88 is/are pending in the application.
- 4a) Of the above claim(s) 19, 21, 22, 25-27, 29-32, 36 and 51-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 17, 23, 24, 28, 34, 35, 37, 44-50, 55-76 and 85-88 is/are rejected.
- 7) ☒ Claim(s) 16 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. This application contains claims 19, 21-22, 25-27, 29-32, 36, 51-53 drawn to an invention nonelected with traverse in the reply filed on 10/06/2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### ***Claim Objections***

2. Claim 48 is objected to because of the following informalities: In lines 2-3, 9, “die” should be “dies”. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-8, 17, 24, 34-35, 37, 44, 48, 62-63, 85-88 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al. (hereinafter as MacDonald) (5,199,917) in view of Hofstee et al. (6,541,847; hereinafter as Hofstee).

**Regarding claims 1, 24, 34, 85-88,** MacDonald discloses a semiconductor device having a substrate 10 (fig. 3) having a first surface, a second surface and a periphery with a die 152 (fig. 3) formed on the first surface; and a plurality (support structures)stiffener components 92 (fig.3) secured to a first surface of the substrate 10 without attachment with an adhesive element, the stiffener components 92 are to increase support or rigidity of the substrate 10, wherein the substrate 10 and the stiffener components 92 are separate components that are attached and secured together (fig. 3).

However, MacDonald does not explicitly teach that the stiffeners are made of molded plastic material.

Hofstee discloses an analogous device having a substrate 120 (122, 123, 124) (fig. 4); and a plurality molded plastic stiffener components 125, 126 (fig.4, col. 5, lines 30-35) secured to a first surface of the substrate without attachment with an adhesive element, the stiffener

components 125, 126 are to increase rigidity of the substrate 120, wherein the substrate 120 and the stiffener components 125, 126 are separate components that are attached and secured together (fig. 4).

Therefore, as to claims 1, 24, 34, 85-88, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the stiffeners of MacDonald with the molded plastic material, as taught by Hofstee, because it has been held to be within the general skill of an artisan in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**Regarding claim 2, 37**, although MacDonald does not teach that the substrate 10 is made of the claimed material, Hofstee discloses the substrate 120 (122, 123, 124) is selected from a group consisting of a laminated polymer, a polyimide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEMI laminate, a CEM3 laminate, and a ceramic metal frame. (see col. 6, lines 55-60) as claimed. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the substrate material of MacDonald with the claimed material, as taught by Hofstee, because it has been held to be within the general skill of an artisan in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**Regarding claims 3-8**, MacDonald as modified by Hofstee discloses the invention substantially as claimed, except that the teaching of the substrate having a range of thickness of less than about 35-75 microns or that the stiffener has a thickness range of less than about 50-100 microns. However, it is well known in the art to vary the thickness of the layers in the semiconductor device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the substrate with a specific range, as

claimed, since it is a prima facie obvious to an artisan for optimization and experimentation with a specific range of thickness because applicant has not yet established any criticality for the specific range.

*Note that normally, it is to be expected that a change in temperature, or in thickness, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 19553.*

**As to claim 17**, MacDonald as modified by Hofstee discloses the stiffeners are in a form of a lattice.

**As to claim 35**, MacDonald as modified by Hofstee discloses the stiffeners 92 (fig. 3) situated at the periphery of the substrate 10 (fig. 3).

**As to claim 44**, MacDonald discloses a method and semiconductor device having a substrate 10 (fig. 3) having a first surface, a second surface and a periphery with a die 152 (fig. 3) formed on the first surface; and a plurality (support structures)stiffener components 92 (fig.3) secured to a first surface of the substrate 10 without attachment with an adhesive element, the stiffener components 92 are to increase support or rigidity of the substrate 10, wherein the

substrate 10 and the stiffener components 92 are separate components that are attached and secured together (fig. 3).

However, MacDonald does not explicitly teach that the stiffeners are made of molded plastic material.

Hofstee discloses an analogous device having a substrate 120 (122, 123, 124) (fig. 4); and a plurality molded plastic stiffener components 125, 126 (fig.4, col. 5, lines 30-35) secured to a first surface of the substrate without attachment with an adhesive element, the stiffener components 125, 126 are to increase rigidity of the substrate 120, wherein the substrate 120 and the stiffener components 125, 126 are separate components that are attached and secured together (fig. 4). Also, Hofstee discloses at least two dies 115, 116 positioned on the first surface of the substrate 120 (fig. 4). It is noted that the molding process of the plastic stiffeners becomes hardening when the stiffeners are formed.

Therefore, as to claims 44, 48, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the stiffeners of MacDonald with the molded plastic material with the hardening step of the stiffeners, as taught by Hofstee, because it has been held to be within the general skill of an artisan in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. Also, with respect to claim 48, it would have been obvious to an artisan to singulate the assembly to separate the two dies because it is well known in the art to singulate the assembly so as to separate the dies.

As to claim 62, MacDonald as modified by Hofstee discloses a method of forming a substrate 120 (fig. 4) and molding a plastic material onto a first surface of the substrate 120 (fig.

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4) proximate a periphery of the substrate to form a plurality of stiffeners 125, 126 (fig. 4) on the first surface of the substrate, wherein the stiffeners 125, 126 and the substrate 120 are separate components.

As to claim 63, MacDonald as modified by Hofstee discloses a method of forming a substrate 120 (fig. 4) and molding a plastic material onto a first surface of the substrate 120 (fig. 4) proximate a periphery of the substrate to form a plurality of stiffeners 125, 126 (fig. 4) on the first surface of the substrate, wherein the stiffeners 125, 126 and the substrate 120 are separate components and that the stiffeners are inherently hardened when attached onto the substrate without adhesive element.

2. Claims 9, 45, 46- 47, 49-50, 55-57, 64-76, are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald in view of Hofstee, as applied to claim 1, 24, 44, 48, above, and further in view of McMillan et al. (5,650,593; hereinafter as McMillan).

**As to claims 9, 55-56, 67,** MacDonald as modified by Hofstee discloses the invention substantially as claimed, except that the stiffener is made of thermoplastic.

McMillan discloses the stiffeners 217 comprises a thermoplastic material (col. 7, lines 30-65).

Therefore, as to claims 9, 55-56, 67, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of MacDonald as modified by Hofstee with thermoplastic as taught by McMillan, because the material is readily available in the art. Further, it has been held to be within the general skill of an artisan in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.



**As to claims 46, 49-50**, MacDonald as modified by Hofstee discloses the invention substantially as claimed, except that the step of applying an encapsulating material to the substrate and molding the encapsulating material into the stiffener.

McMillan discloses an analogous method and device having the step of applying encapsulating material 430 (fig. 17B) to the substrate and molding the encapsulating material into the stiffeners 417 (fig. 17B).

Therefore, as to claims 46, 49-50, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of MacDonald as modified by Hofstee with the encapsulating step, as taught by McMillan, for securing the die to the substrate.

**As to claims 57, 68**, Hofstee discloses a substrate 120 (fig. 4) having a first surface, a second surface and a periphery; a die 115 (fig. 4) situated on a first surface of the substrate 120 and a plurality molded plastic stiffener components 125, 126 (fig.4) secured to a first surface of the substrate without attachment with an adhesive element, the stiffener components 125, 126 are inherently to increase rigidity of the substrate 120, wherein the substrate 120 and the stiffener components 125, 126 are separate components that are attached and secured together (fig. 4). However, Hofstee does not disclose that the stiffener is made of thermosetting polymer material. McMillan discloses the stiffeners 217 comprises a thermosetting material (col. 7, lines 30-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Hofstee with the thermosetting polymer material, as taught by McMillan, because the material is readily available in the art. Further, it has been held to be within the general skill of an artisan in the art to select a known material on the basis of its

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suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**As to claims 45, 47, 64-66, 72-75**, MacDonald as modified by Hofstee discloses the invention substantially as claimed. However, MacDonald as modified by Hofstee does not teach the type of molding process to form the stiffeners on the first surface of the substrate proximate a periphery of the substrate such as transfer molding process, injection molding process, or spray molding process.

McMillan discloses an analogous device and method. McMillan discloses the molding of the stiffeners 217 on the substrate 12, wherein the stiffeners are formed from injection, transfer or spraying molding and then curing the molding material by cooling it for hardening (McMillan, col. 7, lines 30-65).

Therefore, **As to claims 45, 47, 64-66, 72-75**, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of MacDonald as modified by Hofstee with the molding process such as injection, transfer or spray molding of the stiffener materials to form the stiffeners, as taught by McMillian, for attaching the stiffeners to the substrate.

**As to claims 69-70**, although MacDonald as modified by Hofstee does not teach the heating step process of the plastic material, McMillian discloses the heating and cooling of the plastic molding material for hardening (col. 7, lines 30-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of MacDonald as modified by Hofstee with the molding process such as injection,

transfer or spray molding of the stiffener materials to form the stiffeners, as taught by McMillian, for attaching the stiffeners to the substrate.

**As to claim 71**, although MacDonald as modified by Hofstee does not teach the catalyst and the heating step process of the plastic material, McMillian discloses the heating and curing of the plastic molding material for hardening (col. 7, lines 30-65) that inherently includes a catalyst in the plastic material. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of MacDonald as modified by Hofstee with the plastic catalyst and the heating and curing step of the plastic material to form the stiffeners, as taught by McMillian, for attaching the stiffeners to the substrate.

**As to claim 76**, MacDonald as modified by Hofstee and McMillan teaches the substrate 12 (fig. 3) has two or more compartments for receiving dies 34 (McMillan, fig. 3).

3. Claims 10,11 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald in view of Hofstee, as applied to claim 1, and further in view of Admitted Prior Art (APA), figures 1-2 and specification (spec.), pages 1-2.

MacDonald in view of Hofstee discloses a semiconductor device and method having a substrate 20 a molded stiffener 25, 26 molded onto and secured to the substrate 20 without attachment with an adhesive element.

However, MacDonald in view of Hofstee does not disclose that the stiffeners are made of a thermosetting material.

APA discloses a semiconductor device and method having a substrate or lead frame 6 (fig. 1 and spec., page 1, line 13); and a stiffener 14 molded to the substrate 6 (fig. 1). See attachment. As to claims 10, 55-57, the molded stiffeners 14 comprise of thermoplastic or

thermosetting polymeric material (spec., page 2, line12). Note that the molded stiffener is heated and cool to cure the material for hardening.

Therefore, **as to claim 10**, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Hofstee with the thermosetting material for the stiffeners, as taught by APA, so as to provide an equal desirable material for the stiffener. Further, it has been held to be within the general skill of an artisan in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

**As to claim 11**, although MacDonald in view of Hofstee does not teach the limitation of claim 11, APA teaches that the thermal coefficient of the expansion of the molded stiffeners 14 (fig. 1) and the substrate 6 (fig. 1) correspond such that when heating is applied both the stiffeners and the substrate expand roughly the same. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the materials of the stiffener and the substrate so that the thermal coefficient of expansion of the stiffeners and the substrate expand approximately equal. It is noted that it is within the general skill of an artisan in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

4. Claims 23, 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald in view of Hofstee, as applied to claim 1, in view of Gregory (4,710,419).

MacDonald in view of Hofstee discloses the invention substantially as claimed, except that the substrate is in a form of a reel.

Gregory discloses a substrate 30 is in a form of a reel (figs. 2-7).

Therefore, **as to claim 23**, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the substrate of MacDonald in view of Hofstee with the form of a reel, as taught by APA, for easy packaging.

**As to claim 60**, MacDonald in view of Hofstee and Gregory teaches the substrate comprises a leadframe 31 (Gregory, figs.2-7) for reducing cost.

***Allowable Subject Matter***

5. Claims 16, 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not disclose or fairly suggest either in singly or in combination a device having among other elements, the stiffeners comprise at least one cross member.

***Response to Arguments***

Applicant's arguments filed 5/4/09, have been fully considered but they are moot in view of the new rejection.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to (Vikki) Hoa B. Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Ms. Davienne Monbleau, can be reached at (571) 272-1945. The office fax number is 571-273-8300.

Any request for information regarding to the **status** of an application may be obtained from the **Patent Application Information Retrieval (PAIR) system**. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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Lastly, paper copies of cited U.S. patents and U.S. patent application publications have ceased to be mailed to applicants with Office actions since June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site ([www.uspto.gov](http://www.uspto.gov)), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy.

Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

/(Vikki) Hoa B Trinh/

Examiner, Art Unit 2893